Mini Symposium on Solid Oxide Fuel Cells

29'th and 30'th June 2006
Universität Karlsruhe (TH), Germany

Scope

As solid oxide fuel cells approach commercialization over the next three to five years, it is necessary to consider how deployment might occur and how large the potential markets might be. Any direct comparisons between SOFCs and the technologies they are intended to replace must be carried out on the basis of life-cycle costs. Life-cycle costs for fuel cells consist of the fixed initial cost of the unit plus installation (capital expenditure) and the variable costs of fuel consumption and maintenance over the operating life of the system. Historically, fuel cell developers have focused most of their attention on fixed initial cost and system reliability, while paying practically no attention to variable operating costs. However, it is fuel costs that may constitute the majority of the cost over the life of the system, so that electrical conversion efficiency becomes the determinant of commercial viability for systems with long service lifetimes, especially if fuel costs are high. As an added complication, the cost of SOFC stacks scales roughly as the areal power density. This is because the cost to manufacture stacks depends on the amount of relatively expensive ceramic materials and high-temperature metal alloys required. A given stack fabrication technology typically results in an area-specific resistance, ASR, that is unique to the particular cell and stack technology employed, the lower the ASR, the higher the power density that can be achieved. However, for a given ASR, the power density of the fuel cell stack decreases as electrical efficiency increases. This means that a larger stack is required for a system of given power output, increasing the cost of the stack. Therefore, it is necessary to carefully balance the initial system cost with the system efficiency to obtain the lowest possible life-cycle cost. If the system is too expensive, even if the efficiency and reliability are high, the operating cost savings may not justify the initial investment. By the same token, if the system is inexpensive but inefficient, it may be too expensive to operate. Clearly, the optimum is somewhere between these extremes.

In SOFCs, power density and electrical efficiency are related in a complex and non-obvious way. To date, surprisingly little fundamental work has been carried out to develop an understanding of this relationship, but fuel cell developers need this in order to design systems that will meet the requirements of their target markets. The purpose of the Karlsruhe Mini-symposium is to probe the thermodynamic limits of SOFC operation, establish a baseline of what is known about the subject, and develop a path for needed future research on this topic.

Program

The symposium kicks off with the talk of Prof. Robert J. Kee (Colorado School of Mines) on *Research and development opportunities for solid-oxide fuel-cell systems* on 29'th (5.15 pm) at the gathering of Karlsruher Chemical Society followed by welcome dinner for the delegates in the Heinrich-Hertz-Haus on the campus. Full day technical session with presentations and discussions will follow the next day.

Detailed Program Schedule for Friday, 30.06.2006

09:00 hr	**- Welcome**
09:10 hr	**- Discussion on workshop objective (R. J. Kee)**
09:30 hr	**- Fuel Cells and Sustainable Development (W. Winkler)**
10:00 hr	**- Manufacturing and infrastructure (W. G. Coors)**
10:30 hr	**- Reforming chemistry (O. Deutschmann)**
11:00 hr	**- Charge transfer chemistry (D. Goodwin)**
11:30 hr	**- Impedance spectroscopy for identification and optimization of SOFC efficiency losses (W. Bessler)**
12:00 – 14:00 hr	**- Lunch Break**
14:00 – 15:00 hr	**- Lab tour, Institute of Materials for Electrical Engineering (A. Weber)**
15:00 – 16:45 hr	**- Open Discussion Forum**

Registration and participation: Free; please send a short e-mail to the organizers

Attendees
Prominent scientists from United States and Germany will be participating. To name a few,
R. J. Kee, H. Zhu (Colorado School of Mines), D.G. Goodwin (CALTEC), W.G. Coors (CoorsTek), J. Warnatz , W.G. Bessler (University of Heidelberg), W. Winkler (Hamburg University of Appl. Sci.), C. Wunderlich (Staxera GmbH), E. Ivers-Tiffee, A. Weber, R. Reimert, O. Deutschmann (University of Karlsruhe), and many more.

Location
29.06.06 , 5.15 pm, Rudolf-Criegee-Hörsaal, Building Nr. 30.41, Fritz-Haber-Weg 6
30.06.06, 9.00 am, Institut für Technische Chemie und Polymerchemie, Engesserstr 20, 76131 Karlsruhe, Room 104 (First floor)

How to reach Karlsruhe
The university is located well with in the heart of the city and is well connected by piblic transport system. The city map and campus map may assist you in locating the university campus.

Karlsruhe City : W e b S t a d t p l a n --- K a r l s r u h e

University Campus: Universität Karlsruhe (TH) - Interaktiver Campusplan

Contact
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